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Rapid learning with parametrized self-organizing maps.

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Summary: The construction of computer vision and robot control algorithms from training data is a challenging application for artificial neural networks. However, many practical applications require an approach that is workable with a small number of data examples. In this contribution, we describe results on the use of 'Parametrized Self-organizing Maps' ('PSOMs') with this goal in mind. We report results that demonstrate that a small number of labeled training images is sufficient to construct PSOMs to identify the position of finger tips in images of 3D-hand shapes to within an accuracy of only a few pixel locations and we present a framework of hierarchical PSOMs that allows rapid 'one-shot-learning' after acquiring a number of 'basis mappings' during a previous 'investment learning stage'. We demonstrate the potential of this approach with the task of constructing the position-dependent mapping from camera coordinates to the work space coordinates of a Puma robot.

Keywords: parametrized self-organizing maps; computer vision; robot control algorithms; artificial neural networks

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